

What Is Claimed Is:

1. A method of de-inking waste printed paper, comprising:
  - pulping and de-inking waste printed paper in an aqueous medium consisting of water and an enzyme de-inking agent capable of dislodging and dispersing ink particles from pulped paper; and
    - removing the dislodged and dispersed ink particles from the resulting pulp-containing medium.
2. The method of Claim 1 wherein said ink particles are removed by flotation.
3. The method of Claim 1 wherein said ink particles are removed by washing.
4. The method of Claim 1 wherein the amount of enzyme used is in the range of about 0.005 to about 5.0 percent-by-weight based on the dry weight of the wastepaper.
5. The method of Claim 1 wherein said enzyme is selected from the class consisting of cellulase, hemicellulase, pectinase, other carbohydrases and mixtures thereof.
6. The method of Claim 4 wherein said enzyme is a cellulase selected from the group consisting of cellulases derived from *Trichoderma viride*, *Aspergillus niger* and mixtures thereof.
7. The method of Claim 5 wherein the amount of enzyme used is in the range of about 0.005 to about 5.0 percent-by-weight based on the dry weight of the wastepaper.

8. The method of Claim 1 including controlling the pH of said aqueous medium from about 3 to about 7 and controlling the temperature of the pulping process in a range of from about 20°C up to about 60°C.

9. A method of de-inking waste printed paper, comprising:

5 converting waste printed paper to a pulp by contacting said paper with an aqueous medium having a pH less than about 7 and comprising water and a de-inking agent consisting of an enzyme;

10 dislodging ink particles from said waste printed paper by the activity of said de-inking agent; and

removing said dislodged ink particles from the resulting pulp-containing medium.

10. The method of Claim 9 wherein said enzyme is used in an amount between about 0.005 and about 5.0 percent-by-weight based on the dry weight of said wastepaper.

11. The method of Claim 9 including controlling the pH of said pulping and dislodging processes between about 3 and about 7.

15 12. The method of Claim 9 including controlling the temperature of said pulping and dislodging processes between about 20°C and about 60°C.

13. The method of Claim 9 wherein said enzyme is a carbohydrase.

14. The method of Claim 13 wherein said carbohydase is selected from the group consisting of cellulase, hemicellulase, pectinase and mixtures thereof.

15. The method of Claim 13 wherein said carbohydase is a cellulase selected from the group consisting of cellulases derived from *Trichoderma viride*, *Aspergillus niger* and mixtures thereof.

5                   16. The method of Claim 13 wherein said carbohydase is used in an amount between about 0.005 and about 5.0 percent-by-weight based on the dry weight of said waste paper.

10                 17. The method of Claim 13 including controlling the pH between about 3 and about 7 and controlling the temperature between about 20 °C and about 60°C during said pulping and dislodging processes.

18. The method of Claim 9 wherein said aqueous medium consists of water and said enzyme.

15                 19. A method of de-inking waste printed paper, comprising:  
                        converting waste printed paper to a pulp in an aqueous medium comprising water and a de-inking agent consisting of an enzyme selected from the group consisting of cellulase, hemicellulase, pectinase, other carbohydrases and mixtures thereof wherein said enzyme is used in an amount between about 0.005 and about 5.0 percent-by-weight based on the dry weight of said waste printed paper, said contacting being carried out in absence of

any chemical de-inking agent at a temperature between about 20°C and about 60°C and at a pH between about 3 and about 7; and

removing dislodged ink particles from the resulting pulp-containing medium  
by washing or flotation.

- 5        20.      The method of Claim 19 wherein said enzyme is a cellulase selected from the group of cellulases derived from *Trichoderma viride*, *Aspergillus niger* or mixtures thereof.

add a!